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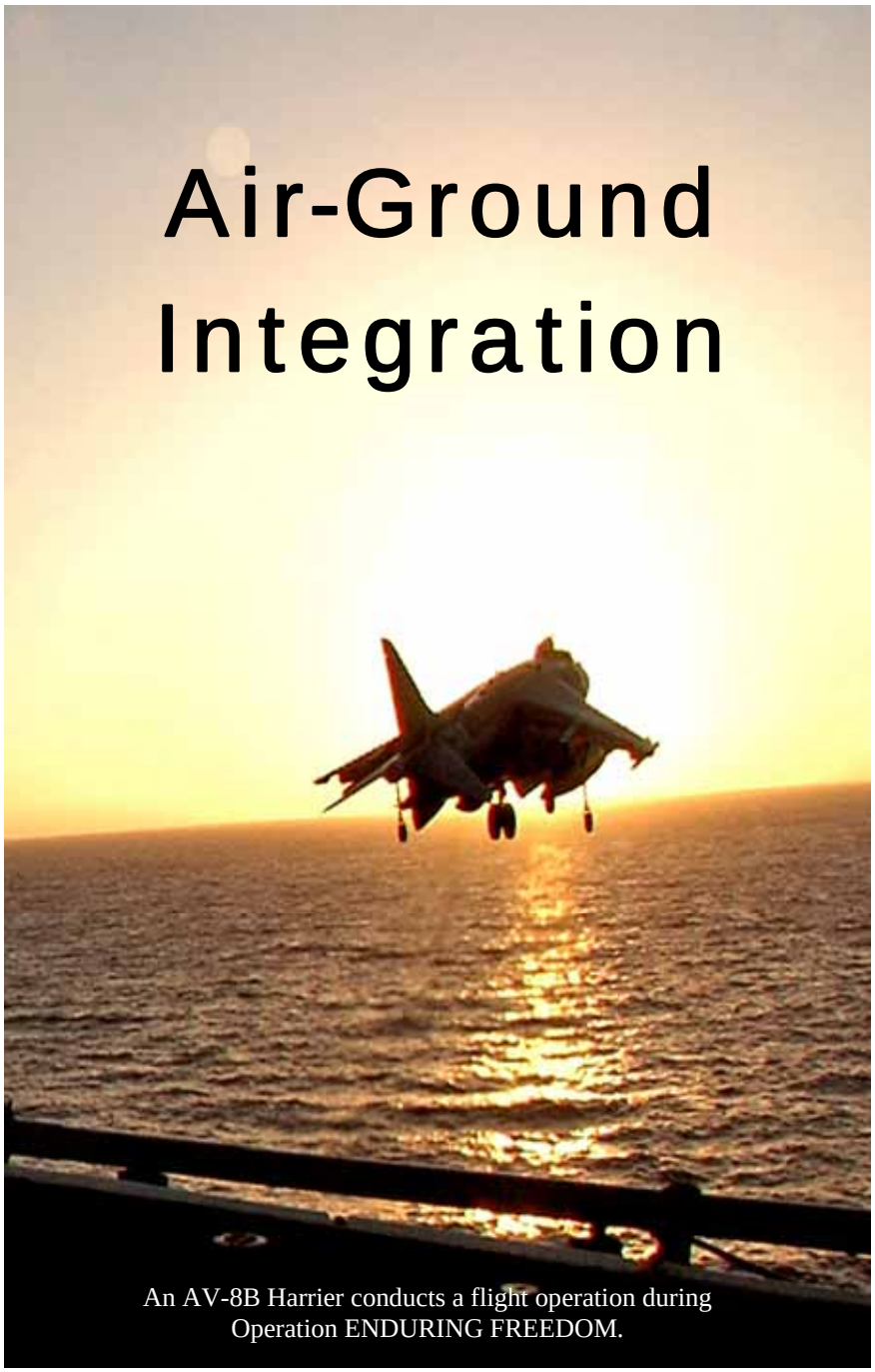
FEATURE ARTICLES

Air-Ground Integration



An AV-8B Harrier conducts a flight operation during Operation ENDURING FREEDOM.

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Cover Photo— MC3 Noel Danseco, USN

Director Comments—Final Thoughts From the Director

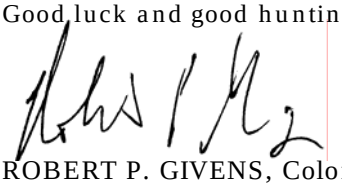
As this issue is being distributed, United States and allied forces have begun a new phase in the war in Iraq. The troop surge is underway and more and more forces are spreading through that country trying to bring stability where possible and engage the enemy as required. A key element to the success of this operation is effective air-ground cooperation. Air-ground elements have to operate very closely at the tactical level to ensure we get the most out of our asymmetric advantage—exclusive use of the third dimension. This is of course nothing new to warfare in the age of flight. Ever since the First World War, militaries have attempted to apply both forms of combat power, from the air and from the ground, in an integrated fashion. The universal lesson from all these attempts, however, is that such integration is just plain hard. There can never be enough work in this area; and therefore, we are concentrating on the subject of air-ground integration for this issue of the "Air Land Sea Bulletin." Since 2005 ALSA has closely monitored this topic and forged some great links with organizations such as the Joint Fires Integration and Interoperability Team (JFIIT), the Army-Air Force Integration Forum, and the respective joint air-ground operations offices of Air Combat Command (ACC) and US Army Training and Doctrine Command (TRADOC). These organizations work the integration piece daily and have been invaluable in guiding current ALSA projects such as the new multi-Service tactics, techniques, and procedures (MTTP) publication for Strike Coordination and Reconnaissance (SCAR) and the revision of our core publication, *Joint Application of Firepower (JFIRE).* Both projects should be in print and in the field by this fall.

This summer will be a time of transition for ALSA as it is with most military organizations. Both CDR John Evans, USN, and Lt Col Rob McCreadie, USAF, are retiring after successful careers in the service of our country. On the PCS side we are losing COL Sam Clear, USA; LTC Bob Finn, USA; Lt Col Jim Egbert, USAF; and LTC Rob Murphy, USA. These action officers have done outstanding work and will be sorely missed. Their contributions have had a significant impact in meeting the immediate needs of the warfighter. On the brighter side we have two new lieutenant colonel selects among our USAF officers. Majors Brady Merrill and Lance Yarborough both came out on the USAF's latest O-5 promotion list. ALSA action officers continue to do well in their respective Service/career fields.

On a personal note, this will be my last input to the "Air Land Sea Bulletin" as I prepare to take command of the 56th Operations Group at Luke AFB, Arizona. While I am ecstatic about returning to fly and to lead F-16 pilots, I am somewhat reluctant to leave such a great organization and the wonderful work that is done not just here at ALSA but in the doctrine community. Most warriors do not dream of being doctrine or TTP writers when they are junior officers but some do find their way there. After my experience in this position I realize that those that do are the fortunate few. All of our experiences in the field, at sea, or at high altitude mean nothing if we can't repeat our successes and alter our failures. Capturing these lessons for future operations and future generations of warriors is perhaps one of the most important things a true professional could ever do. My sincere thanks and admiration goes out to those who support this endeavor and to those who do the heavy lifting from across all the Services both in and out of uniform. COL Tom Murphy, USA, will take over as Director of ALSA in May and will no doubt continue to add to the great reputation of this multi-Service community.

As always, we continue to seek and welcome ideas from the field to fill voids between Service and joint doctrine. For more information on any of our MTTP publications or to make a new publication recommendation, visit our Web site at https://wwwmil.alsa.mil or contact us at DSN 575-0902 or Com (757) 225-0902.

Good luck and good hunting,



ROBERT P. GIVENS, Colonel, USAF
Director

AC-130 Gunship and JSTARS Integration in Conducting Dynamic Targeting

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The find, fix, track, target, engage, and assess (F2T2EA) kill chain is a process that receives emphasis in today's current operations. Accelerating or making this process more flexible has become known as dynamic targeting (DT). The AC-130 gunship has been tasked to support this mission since Operation DESERT STORM and continues in Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF). From the origins of surface-to-surface missile system (SCUD) hunting in western Iraq to locating, killing, or capturing high value individuals, DT is quickly becoming a way of employing air power instead of what previously was a single special event.

...integration of the two platforms allows the kill chain to be accomplished more efficiently.

In the past, aircrews from all weapon systems were able to meticulously mission-plan their sortie. This was possible because crews were briefed which targets they were expected to engage in a specific air tasking order (ATO) cycle. Often, these targets did not change and in-flight retargeting was rare. However, there was a possibility mission-planned targets would not be located in their briefed locations. As a result, the increase in mobile targets could mean the assets would become underutilized. Today improvements in technology and integration make it possible for crews to coordinate better during a flight to locate and/or engage targets identified "within" the ATO cycle.

AC-130s, although traditionally used in a close air support (CAS) role, have the capability to perform air interdiction (AI). The gunship crews are able to use sensors to perform the fix and target portion of the F2T2EA chain. They are also able to engage if necessary or utilize other assets to interdict targets.

When working killbox operations, large areas are required to be searched for possible targets. The gunship crew has the ability to accomplish this task, however at their slow airspeeds, this requires a lot of time. To shorten this time and maximize fire power, offboard sensors are necessary. Joint Surveillance Target Attack Radar System (JSTARS) brings the ability to surveil large areas effectively and report movement of land or maritime targets to the gunship crew. This relieves the gunship from trying to conduct reconnaissance of an entire area and to focus on responding to cueing from JSTARS. Once the JSTARS accomplishes the "find" step, the AC-130 crew can fix, track, target, and if required, engage the target. Finally, the AC-130 can utilize their sensors to assess the effects of the engagement. The gunship crew investigates the JSTARS information and uses its own capability to identify (ID) and determine if the cue from JSTARS is a valid target. The JSTARS is not able to ID tracks of interest as friendly or enemy, but with the synergy of the sensors onboard the gunship, ID is possible. Once it is determined that the track is a valid target, the integration of the two platforms allows the kill chain to be accomplished more efficiently. JSTARS utilizes battle management command and control to obtain clearance to engage a target from the aerospace operations center (AOC). This is accomplished more effectively than if it were attempted by the gunship alone, allowing the gunship crew to service the target in less time and allowing for additional mission time to hunt for new targets.

E-8C Joint Surveillance Target Attack Radar System, 12th Expeditionary Airborne Command Control Squadron, in flight over Iraq in support of Operation IRAQI FREEDOM. (USAF photo by SSGT Suzanne M. Jenkins)

Mission planning is another area that can likely maximize the integration of these two platforms. With proper coordination, both crews can agree on working areas that best utilizes their systems to execute the mission. By knowing the gunship working area, the JSTARS can search the area prior to the AC-130 arriving on station. It can then provide a current, as well as a historical, picture of the operating area. When the AC-130 crew accomplishes their check-in with JSTARS, they can get the "lowdown" for the area of interest. By knowing this information prior to arrival on station, the AC-130 crew can determine their reconnaissance route. The crew now uses the intelligence obtained from the JSTARS to help refine their search patterns and to become more effective at their reconnaissance of a large area. Once the gunship is established, they will ask for "details" on the tracks of interest. This further assists the crew in their efforts for locating these tracks and utilizing them better. Furthermore, when the JSTARS has screened an area, the gunship crew does not spend time over areas that do not have activity. Good mission planning allows the gunship crew to spend more time loitering over areas that have a higher probability of viable targets.

Since the AC-130 has limited hard-target kill capability, the JSTARS crew can task another asset to the operating area to complete this mission. JSTARS can pass all the information required to coordinate with the gunship crew, including callsign, location, target type, and altitude of the AC-130. Additionally, JSTARS has the capability to talk to more players and can quickly identify the most capable asset to assist in the engagement of the newly found target. This leverages the JSTARS overall battlespace awareness. Finally, if the AC-130 must return to base (RTB), JSTARS can maintain continuity and pass important information to new crews entering the working area. As air operations continue to transition to a more dynamic process, integration of assets is critically important to effective utilization of air power.

The combination of the AC-130 and JSTARS demonstrates how integration allows for dynamic missions to be accomplished quickly and effectively. By working together and leveraging off of the other platforms strengths, the time required to accomplish the F2T2EA chain is greatly reduced. Furthermore, the integration of these two assets allows for a more robust command and control architecture. Information can be quickly passed for commanders to make better decisions on such things as collateral damage, fratricide, etc. Faster and more accurate communication helps keep the enemy on the run, and unable to reconstitute, and ensures this working relationship will ultimately be one key to success in the war on terror.

JSTARS can pass all the information required to coordinate with the gunship crew

A special operations wing AC-130 Hercules gunship on a training mission over the Gulf of Mexico.
(DOD photo by Ken Hackman)

Strike Coordination and Reconnaissance Operations in the Royal Air Force

By
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Strike coordination and reconnaissance or SCAR as it is known has been a core capability of the Royal Air Force (RAF) ground attack aircraft for many years but recent conflicts have brought the discipline to the forefront of campaign planning. Units are now including SCAR missions and skill sets in annual training syllabi and many of the equipment upgrades going through United Kingdom (UK) air assets are enhancing our ability to perform SCAR.

...ensure the right capability is directed at each target set

So what is SCAR and why is it so important? And perhaps more importantly does the RAF view SCAR differently than United States (US) military units?

Recently UK personnel were able to participate in ALSA working groups to better UK and US interoperability and, not unsurprisingly, it was quickly apparent that UK and US views of SCAR were identical. The working group defined SCAR as:

A mission flown for the purpose of locating, identifying, and reporting targets in a specified area and coordinating reconnaissance, armed reconnaissance, and air interdiction assets to achieve desired effects on those targets.

Commanders use the concept of SCAR to make effective use of the air assets in areas away from friendly forces. The use of SCAR assets to maintain the momentum of attacks rather than merely tasking individual units to areas increases the effects and 'feeds the fight.' SCAR maintains situational awareness (SA) on the area, manages the assets to ensure the right capability is directed at each target set, and then calls in more assets if required.

The aim of this article is to discuss the RAF's capability in the SCAR mission. At present two key platforms participate in the SCAR role, the Harrier GR9 (similar to the AV8B) and the Tornado GR4 and this article discusses their relative strengths and weaknesses. Then training for SCAR is discussed before finishing with a look at the future of SCAR in the RAF including a look at new equipment and training opportunities.

SCAR FROM A HARRIER GR9 PILOT'S PERSPECTIVE

The Harrier GR9 is new to the RAF, coming into operational service only last year. It is an upgrade of the successful GR7 which has seen service in the Gulf, the Balkans, and Sierra Leone in recent years. It is capable of operating from unprepared strips, including grass, and from aircraft carriers. The upgrade of the GR7 has improved navigation and weapon aiming systems and introduces new weapons to an already impressive arsenal.

Targeting Pods. The GR9 is equipped with either the Sniper or TIALD 500. Sniper is a third-generation advanced targeting pod equipped with a full motion video downlink and the TIALD 500 is an electro-optical (EO)/infrared (IR) second-generation targeting pod. Both offer some SCAR utility, though the better optics and features such as IR pointers on the Sniper pod make it more capable of locating, identifying, and handing off targets.

Navigation. The GR9 upgrade introduces a ring laser gyro inertial navigation system, coupled with integrated global positioning system (GPS) to give an extremely accurate navigational solution.

Sensors. All GR9 aircraft are equipped with a forward-looking infrared and night vision goggles enabling night operations. These sensors, combined with the targeting pods, allow for effective 24-hour SCAR operations.

Weapons. When operating in the SCAR role the GR9 can be equipped with unguided 500 and 1,000 lb high/low drag weapons, GPS/laser-guided bombs, Mavericks, and CRV7 rockets. Brimstone anti-armour weapons are due to be introduced to the GR9 in 2008. The GR9 is able to mix and match the weapons

carried, improving flexibility of targeting and allowing for both marking and prosecuting targets from the same aircraft.

Limitations. The GR9 lacks a gun; this is in part compensated for by the use of the rockets.

Royal Air Force GR4 Tornado fighter over Iraq during a combat mission in support of Operation IRAQI FREEDOM. (USAF photo by SSGT Lee O. Tucker)

TORNADO GR4 AND SCAR

The Tornado GR4 is a two-seat ground attack aircraft ideally suited to the SCAR role. Initially designed as a deep strike aircraft it has developed into a very effective close air support (CAS) asset. It is capable of operating for 2 hours in between air-to-air refuelling brackets. Some of the key features that make the GR4 ideal for SCAR are:

Targeting Pods. The GR4 is equipped with either the Litening III or TIALD 500. Litening III, like Sniper, is a third-generation advanced targeting pod equipped with a full motion video.

Navigation. The GR4 operates with a blended GPS/inertial navigation system (INS) navigation solution which enables the aircraft to generate accurate 3D coordinates.

Sensors. Like the GR9, all GR4 aircraft are equipped with a forward-looking infrared and night vision goggles enabling night operations. The aircraft also features terrain following radar allowing low level flight in poor weather; this feature is less relevant for SCAR operations, which inherently require good weather for target identification (ID) but does ensure that the aircraft will always get through to the area.

Weapons. When operating in the SCAR role the GR4 can be equipped with unguided 1,000 lb high/low drag weapons, GPS/laser-guided bombs, Brimstone anti-armour weapons, and a 27mm gun.

Limitations. The GR4, like all aircraft, has a number of limitations that affect SCAR operations, such as a limited mixed load capability and only one secure radio. Both of these issues are being addressed at this time.

TRAINING FOR SCAR

Training for SCAR in the RAF ranges from a simple coordination and search exercise in the UK looking for suitable targets (these can be simulated by declaring trucks, 'white vans,' and cranes as military vehicles and missile systems) and then coordinating simulated strikes against them to training over large scale military exercises. Airspace in the UK is restricted and is particularly limited over the main army ranges so opportunities for 'real' training with military targets are few and far between. This is ameliorated by routine visits to the US and desert regions such as Oman to participate in large scale land exercises and more recently to emerging opportunities in the Czech Republic. SCAR as a mission is relatively simple as it is essentially a combination of existing skill sets:

The ability to find and identify a target is a skill set required of any aircrew...

The ability to find and identify a target is a skill set required of any aircrew engaging in air-to-ground operations. Any aircrew could be called upon to be an on-scene commander in the event of a downed wingman and the requirement to coordinate other assets and knowledge of other platform capability within a coalition is a skill set that we should all strive to attain, maintain, and develop.

THE FUTURE OF SCAR IN THE RAF

Both the GR4 and GR9 have recently been upgraded to carry advanced targeting pods (the Litening III and Sniper, respectively), improving the aircrews' ability to positively identify targets without having to manoeuvre their aircraft into range of the threats ranged against them. Later improvements on both platforms included:

—data links (both link 16 and VMF CAS formats) enabling quick and secure transmission of targeting data between air assets and C2 platforms;

—improved communications suites to increase secure communications;

—and improved weapons loads, by introducing new weapons such as the Paveway IV (featuring in flight fuse and profile programming) and Brimstone anti-armour weapons and allowing for more flexible mixed loads to be carried.

The extended future of SCAR within the RAF will be carried by the Typhoon which is due to be declared air-to-ground capable in the near future and the Joint Strike Fighter, due in service with the RAF in 2012. But that's the subject of a whole new article...

Bomber Strike Coordination and Reconnaissance

B-52 Stratofortress bomber takes off from a classified location on its way to Afghanistan in support of Operation ENDURING FREEDOM. (USAF photo by SMSgt John Rohrer)

By
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Today's battlespace demands greater flexibility in identifying and destroying targets. The adversary exploits shortfalls in intelligence and in the command and control (C2) structure's ability to target objectives. The adversary denies attacks by expending massive effort and resources relocating assets. The timeline required for the current air tasking order (ATO) cycle is deficient when countering mobile adversary tactics. C2 can alter the tempo of campaigns by tasking airborne assets to observe and control the effects within portions of the battlespace. The SCAR mission achieves this by compressing the decision cycle to strike a target from hours or days to minutes. Further, it provides rapid follow-up with bomb-hit assessment (BHA). Dictating tempo enhances offense and allows friendly forces to fight the battle on their terms.

The United Sates military has employed versions of the SCAR concept for many years. Modified forms before the term SCAR was coined include Hunter-Killer and Killer-Scout operations.[1] The Marine Corps first published a SCAR definition in a tactical volume (see Marine Corps Warfighting Publication 3-23.2, *Deep Air Support*) defining the discriminating factor between SCAR and armed reconnaissance as the coordination between airborne platforms. [2]

SCAR allows the striker to find, fix, track, and target the adversary and decide if the requisites for attack are met. The requisites for target strike include

positive identification (PID) and compliance with collateral damage estimation (CDE) requirements as dictated by the rules of engagement (ROE) in the special instructions (SPINS) and theatre airspace control order.

Another definition of SCAR states the tactic as the airborne acquisition, reporting, and direction of assets to employ ordnance on targets in a low-to-medium risk threat environment.[3] It requires extensive communication and permissive conditions. At times, the SCAR tactic may not require ordnance in order to achieve the desired effect. For example, the surface-to-surface missile system (SCUD) hunts in the western Iraqi desert may not have destroyed many missiles, but the effort and missions "reduced Iraq fire rates."[4] Given this understanding, it becomes apparent the earlier explanations of SCAR were incomplete. Breaking the mindset that ordnance employed and target destroyed equates to objective accomplishment, expands the definition of SCAR to the airborne acquisition, reporting, and coordination of assets to achieve desired effects on targets. Now, how does a tactic advancing the autonomous operation of airborne assets support air-ground integration? Furthermore, why is the bent of this article focused on bombers when the tactic has resided almost exclusively in the domain of their more agile fighter brethren? Setting the stage with an explanation of SCAR facilitates the discussion on bombers and air-ground integration.

SCAR

In much the same way a ground commander is responsible for all the effects within the battlespace, whether it is electronic attack, fires from organic or close air support (CAS) assets, surveillance, etc., the airborne commander is responsible for all of the effects within the assigned battlespace. Even though SCAR may not exclusively pursue fleeting targets, many of the tactics and techniques used in targeting time-sensitive targets (TSTs) apply as outlined in FM 3-60.1; MCRP 3-16D; NTTP 3-60.1; AFTTP(I) 3-2.3, *Multi-Service Tactics, Techniques, and Procedures for Targeting Time-Sensitive Targets*. At the most basic level, SCAR assets must find, fix, track, target, engage, and assess.

A typical SCAR mission begins well before aircraft leave the ground. Intelligence assesses the area and employment tactics begin to emerge. Intelligence can utilize historical data and assessments to help develop named areas of interest (NAIs) within the crew's area of responsibility. This focuses the search for targets and utilizes SCAR resources more efficiently.

Airborne, SCAR begins with searching or *finding* the first step in the SCAR targeting process. Using NAIs to focus searches maximizes limited resources and expedites results. Then the SCAR coordinator directs and controls assets to produce the desired effects upon identified targets. The coordination of these assets is the key role of the SCAR coordinator. Moreover, unlike many other strike missions where termination is marked by tactics utilizing expeditious exits to mitigate risk, the SCAR tactic continues beyond post-strike egress. The most critical aspect of SCAR is providing immediate BHA. Just as the SCAR mission begins with reconnaissance, the targeting cycle is not complete until strike effectiveness is assessed. Achieving the desired effects (kinetic or non-kinetic) versus simply employing and leaving, requires assessment. Final assessment of objective accomplishment denotes SCAR targeting cycle completion for that target; otherwise, it just becomes autonomous interdiction.

At times, the SCAR tactic may not require ordnance in order to achieve the desired effect...

BOMBERS

Bombers greatly enhance the SCAR tactic. Most considerations for planning a bomber SCAR asset are similar to fighter issues, with some special considerations. While onboard assets vary from platform to platform (crew positions, electronic attack suites, passive and active sensors, etc.), bombers can leverage their common strengths for objective accomplishment to augment battlespace awareness and enhance combat effectiveness.

First, the bomber offers long unrefueled loiter times and with its massive and versatile weapon load can support multiple SCAR coordinator's during one vulnerability period. Multiple crew positions allow division of duties to reduce workloads in saturating environments. The crew can also integrate an expanding array of electronic sensors to find, fix,

track, target, engage, and assess. Moreover, the bomber can support other SCAR assets with electronic attack.

B-52 Stratofortress bomber drops live ordnance over Point Bravo, Nevada, during a firepower demonstration. (USAF photo by SRA Brian Ferguson)

The bomber makes a capable controller as well as a lethal striker. As a SCAR coordinator, thanks to longer legs, the bomber can dedicate greater amounts of time to preparing the battlespace before the first attack assets arrive on station. The bomber offers superior continuity between rotating SCAR assets and improves situational awareness of the battlespace especially when tanker assets are limited or unavailable. The striker assets may simply rotate, refueling on a tanker until all ordnance is expended, or multiple strike packages may flow through under the control of a single bomber. Moreover, bomber over-the-horizon communications allow real-time interface with the air operations center. Lastly, typical bomber employment altitudes place the platform outside of the lethal range of all currently fielded ground-based infrared threats as well as most antiaircraft artillery. However, the risk the threat poses must always be carefully weighed against sensor capability and PID needs. Bomber employment altitudes present one last advantage to the SCAR coordinator role; deconfliction is simplified by placing the bomber above most other strikers and their weapon trajectories.

The bomber brings many capabilities to SCAR operations

AIR-TO-GROUND INTEGRATION

Why, in a volume dedicated to an air-to-ground integration theme, is SCAR being discussed? From everything discussed here, unlike CAS, "detailed integration" with ground forces is not required. Nonetheless, SCAR enhances air-to-ground integration in several ways. One, it directly and indirectly affects ground operations beyond the fielded forces' direct influence. Measuring the indirect effects is a problem that fills volumes and is not germane to this discussion, but direct effects can be observed, reported, and compared to measures of effectiveness. The results will alter assessments and impact decisions on future operations.

SCAR affects the timing and tempo of the ground campaign via parallel attacks, striking deeper than organic ground assets can see or reach. This allows ground forces to focus on their primary objectives. It suppresses enemy ground and air tactics or alters their weapons of mass destruction (WMD) tactics through simple presence. Bottom line, SCAR shapes the battlespace.

The high-ground advantage SCAR assets exploit leverages the third dimension and can redirect timing and tempo. SCAR missions integrate with ground forces by supporting pauses in the ground effort when the current targeting cycle cannot respond quickly enough, thereby portraying a relentless assault not allowing enemy forces to reconstitute. Sundry possibilities exist to exploit the synergistic effects SCAR missions bring to air-ground integration.

The SCAR role requires a permissive communication environment and an area with at least local air superiority in order to direct assets and complete the targeting process. If C2 has well-defined ROE, the SCAR tactic can solve many problems associated with the current tempo of operations, especially for assets that fly from forward operating locations far removed from theater. SCAR assets control all the phases of decision making, compressing the decision cycle to the most efficient possible. SCAR alters tempo and provides flexibility to enhance offense and provide solutions to diminish the advantage of enemy mobility. Ultimately, it enhances air-to-ground integration, when coupled with well-defined ROE, by providing synergistic effects with ground operations.

The bomber brings many capabilities to SCAR operations. Bomber loiter times enhance strike control continuity in the target area. Preferred bomber employment altitudes lend themselves to automatic deconfliction from lower strikers as the bomber fulfills the role of the SCAR coordinator. Additionally, the crew can

share the intense workload, crosscheck computations, and delegate duties across compartments during these airborne mission commander operations as plans develop on the fly. While bombers may not share all of the capabilities of other platforms, proper integration with other assets and exploiting their capabilities mitigate some bomber limitations. Ultimately, the bomber with its massive weapon load and versatility multiplies the available support and with its inherent strengths provides greater battlespace awareness and control.

END NOTES

[1] Maj Michael Webb, "F-15E Close Air Support and Strike Coordination and Reconnaissance Execution (U)," EMP213P, Lecture, USAF Weapons School, Nellis AFB, NV, Oct 2003. (S/NF) (Information extracted is unclassified.)

[2] Marine Corps Warfighting Pamphlet (MCWP) 3-23, Vol 2, *Deep Air Support*, 4 Jan 2001, 1-6 thru 1-8.

[3] Capt David Moeller, "F-15E Close Air Support and Strike Coordination and Reconnaissance Execution (U)," EMP213P, Lecture, USAF Weapons School, Nellis AFB, NV, Oct 2002. (S/NF) (Information extracted is unclassified.)

[4] Barry R. Schneider, "Counterforce Targeting Capabilities and Challenges," 14. The Counterproliferation Papers, Future Warfare Series No. 22. USAF Counterproliferation Center, Air University, Maxwell Air Force Base, AL.

Electronic Warfare Coming to JFIRE

An EA-6B Prowler aircraft assigned to the "Patriots" of Electronic Attack Squadron One Four Zero makes an arrested landing aboard Nimitz-class aircraft carrier USS *Dwight D. Eisenhower* (CVN 69) in the Arabian Sea. (USN photo by MCSN Travis Alston)

By
Capt K. DeWalt Alderman, USAF
Mr. Thomas Brumfield, CTR, BAE
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Electromagnetic interference (EMI) reduces combat effectiveness in Iraq. The United States and coalition military forces increasingly rely on the radio frequency (RF) spectrum to conduct net-centric military operations. Electromagnetic (EM) "fratricide" (unintentional jamming of friendly systems) can negatively impact every friendly action on the battlefield. Due to EMI, units report daily that equipment does not work as designed.

Expanding user requirements have increased the complexity of planning and management of the EM environment. This challenge is aggravated by the need to conduct electronic warfare (EW) against insurgent RF systems used for communication and to control remotely triggered weaponry. The proliferation of transmitters in the finite RF spectrum by both the

civilian and military communities highlights the need for effective EW tactics, techniques, and procedures (TTP) and a cadre of well trained electronic warfare officers (EWOs).

US forces have brought a considerable number of systems to Iraq that use the RF spectrum, including radars for surface air defense systems, weather, ground and airborne surveillance, fighter fire control, and maritime operations—most notably the high powered Aegis SPY-1. Military forces also rely on ultrahigh frequency (UHF)/very high frequency (VHF)/frequency modulation (FM) line-of-sight radios; satellite communications (SATCOM)—UHF, extremely high frequency (EHF), and commercial; and data links—Link 11 and 16; Officer in Tactical Command Information Exchange System (OTCIXS); Integrated Broadcast System (IBS); and Situation Awareness Data Link (SADL). The increasing number of Army unmanned aircraft system (UAS) platforms operating at varying altitudes up to 16,000 feet compounds the challenge of deconflicting friendly RF emitters. These communications, telemetry, and data link systems mostly operate in the 100-2,000 Mhz frequency range.

...units need joint EW TTP and must train to them before deployment.

Coalition forces also deploy with similar RF transmitters, and diplomatic staffs must also communicate using RF spectrum radios and SATCOM transmitters.

In addition, many of the 26 million people in Iraq use some sort of technology that propagates energy in the RF spectrum. For example, there are over 5 million cellular phones and this number grows daily. Additionally, tens of thousands of satellite systems like Iridium, Globalstar, Inmarsat, and Thuraya are in use, as well as large numbers of handheld push-to-talk radios and high powered cordless phones. Dozens of civilian radio and television stations broadcast RF energy throughout Iraq with transmitters capable of producing many kilowatts of power. Microwave radio relays, commercial SATCOM, WI-FI, Bluetooth, Bank and other security systems, remote vehicle key fobs and garage door openers, and other types of transmitters use the RF spectrum. Neighboring nations also have their own RF systems that propagate throughout the region. Most of these systems also crowd the 100-2,000 Mhz frequency range.

Moreover, insurgents use the 100-2,000 Mhz frequency range for command and control and to trigger improvised explosive devices (IEDs). The Army and Marine Corps have deployed over 20,000 ground-based jammers to combat these weapons, which also operate in the same frequency spectrum.

In response to the growing demands placed on the EW mission area, the Services have identified three shortfalls: manning, training, and TTP.

In Iraq, the US Army lacks trained EWOs to effectively employ EW. The Army is addressing the manning shortfall by standing up its EW course at Fort Sill, Oklahoma, to train EWOs; however, it will take some time to fill the manpower gap. The Navy and Air Force have a cadre of EWOs that support EW operations during maritime and aerospace missions. The Marine Corps have EWOs from their EA-6B and radio battalion units that support EW operations in Marine air-ground task gorce (MAGTF) missions. While the Navy, Air Force, and Marines have sufficient manpower to conduct their own Service EW operations, joint EW operations are woefully undermanned.

EW is joint by its very nature because it freely propagates through the EM spectrum, which is unconstrained by sector boundaries or national borders and extends throughout the maritime, land, special operations forces (SOF), and air areas of responsibility. Thus, units need joint EW TTP and must train to them before deployment. Currently, Services' EW doctrine does not include lessons learned from Operation IRAQI FREEDOM and Operation ENDURING FREEDOM. Furthermore, Services' EW TTP and training lacks joint context, and joint EW TTP (Joint Publication 3-13.1, *Electronic Warfare*, 14 July 2006) lacks a tactical perspective. Because of manning and TTP shortfalls, joint EW training is almost nonexistent.

The Joint Fires Integration and Interoperability Team (JFIIT) and Joint Information Operations Warfare Command (JIOWC) are teaming up with the Air Land Sea Application (ALSA) Center to address the lack of effective EM spectrum management, coordination, and TTP for joint EW in the *Multi-Service Procedures for the Joint Application of Firepower (JFIRE).*

When published (current expected publication date Sep 2007), joint warfighters can go to the updated *JFIRE* to gain knowledge on subjects such as incorporating intelligence to improve EW support to operations; implementing spectrum management between ground, air, and maritime forces; and filling out Joint Tactical Air Strike Requests (JTASR) and Electronic Attack Request Forms (EARF) to request electronic fires support. *JFIRE* will provide guidance needed for Services to perform joint EW and spectrum management in the current and future fight.

Joint Fires Observers (JFO)

By
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Fort Sill, OK

Ongoing operations continue to demonstrate the Army requirement for terminal attack control capability to maneuver at company level. The Air Force is increasing joint terminal attack controller (JTAC) authorizations/structure and will increase this structure to meet Army requirements. However, training JTACs in the required knowledge and procedures will take some time. To mitigate this gap, Soldiers are being trained in the skills needed to work with a JTAC, as an extended set of eyes, providing targeting data and terminal guidance, if required. These Soldiers are referred to as Joint Fires Observes (JFOs) and the Army's goal is one JFO per maneuver platoon.

The AC-130 gunship's primary missions are close air support, air interdiction, and force protection. (USAF photo)

A JFO memorandum of agreement (MOA) was signed between the Departments of Army and Air Force and the United States Special Operations Command in November 2005. The MOA standardizes JFO certification/qualification, currency requirements, and the four JFO duty areas. JFOs are defined as:

"A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 [close air support] CAS terminal attack controls, and perform autonomous terminal guidance operations (TGO.)"

The current training focus is on company fire support officers/non-commissioned officer (NCOs), platoon forward observers, combat observation lasing teams, and members of scout/reconnaissance organizations. As training load allows, other Soldiers will be scheduled for the course. The course is currently in Army training requirements & resources system and more information can be found at the Ft. Sill, OK, website or the point of contact at DSN 639-2353. Priority is given to deploying units so coordination with the school is important to obtain course allocations.

...each brigade combat team will manage JFO currency.

JFOs are trained on a jointly approved program of instruction at either Ft. Sill, OK; Nellis AFB, NV; or at Spangdahlem, GE. The JFO course is 10 days. Students graduate as a certified JFO with a project development skill identifier (PDSI). Eventually the Army will convert the PDSI into an Additional Skill Identifier (ASI). Work is ongoing to document the ASI in all unit manning documents to reflect the JFO at platoon and company level. Training consists of 27.5 hours classroom, 28 hours of simulation, and live CAS instruction. Included in the academic instruction is training on the development of precise coordinates using the Precision Strike Software-Special Operating Forces (PSS-SOF). The students graduate with all required documentation (JFO Training Jacket), requiring only a JFO designation letter from their battalion commander to begin performing as JFOs.

JFO currency is then maintained at unit level in accordance with the requirements of the MOA. Optimally, the senior 13F in each brigade combat team will manage JFO currency and coordinate

training in conjunction with USAF JTACs in the supporting air support operations squadrons (ASOSs). To remain certified, the JFO must meet the following semi-annual requirements:

a. 6 fixed or rotary wing events including: 2xLive/simulation laser TGO events; 1xLive Type II control w/JTAC; 1xSimulation Type I control; 1xLive/simulation abort; 1xLive/simulation night target marking event.

b. 6xLive/simulation call for fire events.

c. 1xLive/simulation AC-130 call for fire event.

d. 6xLive/simulation Calls for Fire (surface to surface).

...ongoing training and qualification of JFOs are key factors in their success.

JFOs require some additional equipment to ensure they are prepared for their duties. This equipment includes: single-channel ground and airborne radio system (SINCGARS) radio, infrared (IR) strobe light, IR pointer, IZLID 1000 and VS17 marker panel(s). Additional beneficial equipment includes: AN/PRC117F, AN/PRC 148, SeeSPOT III Thermal Scope, SMP 1000 or 2000 Micro ponder, and Green Beam Pointer.

Both the Army and Air Force have released messages to the field describing the JFO concept, training and qualification requirements, and emphasizing the commander's role in the JFO program. While JFOs can be a critical force enhancement to unit operations, the ongoing training and qualification of JFOs are key factors in their success. Coordination between the supporting ASOS and JTACs and the Army unit JFOs results in better training, mutual trust, and reduced time for target engagement.

Soldiers perform maintenance on an AH-64 Apache attack helicopter on Forward Operating Base Speicher in Iraq. (USA photo by Sgt Tom Pullin)

CURRENT ALSA PROJECTS

AIR TEAM – POC alsaa@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
ADUS *Multi-Service Tactics, Techniques, and Procedures for Air Defense of the United States* **Classified SECRET/ REL CAN**	22 MAR 04	FM 3-01.1 NTTP 3-26.1.1 AFTTP(I) 3-2.50	Description: Supports planners, warfighters, and interagency personnel participating in air defense of the US by providing planning, coordination, and execution information. Pub is primarily focused at the tactical level. Status: **Current**
AIR OPERATIONS IN MARITIME SURFACE WARFARE **Distribution Restricted**	NEW		Description: Describes MTTP that will integrate Service capabilities to attack enemy surface vessels from the air. Status: **New (2nd JWG in May 07)**
AVIATION URBAN OPERATIONS *Multi-Service Tactics, Techniques, and Procedures for Aviation Urban Operations* **Distribution Restricted**	9 JUL 05	FM 3-06.1 MCRP 3-35.3A NTTP 3-01.04 AFTTP(I) 3-2.29	Description: Provides MTTP for tactical-level planning and execution of fixed- and rotary-wing aviation urban operations. Status: **Current**
JFIRE *Multi-Service Procedures for the Joint Application of Firepower* **Distribution Restricted**	29 OCT 04	FM 3-09.32 MCRP 3-16.6A NTTP 3-09.2 AFTTP(I) 3-2.6	Description: Pocket size guide of procedures for calls for fire, CAS, and naval gunfire. Provides tactics for joint operations between attack helicopters and fixed-wing aircraft performing integrated battlefield operations. Status: **Revision (Worldwide Review)**
JSEAD / ARM-J *Multi-Service Tactics, Techniques, and Procedures for the Suppression of Enemy Air Defenses in a Joint Environment* **Classified SECRET**	28 MAY 04	FM 3-01.4 MCRP 3-22.2A NTTP 3-01.42 AFTTP(I) 3-2.28	Description: Contributes to Service interoperability by providing the JTF and subordinate commanders, their staffs, and SEAD operators a single, consolidated reference. Status: **Current**
JSTARS *Multi-Service Tactics, Techniques, and Procedures for the Joint Surveillance Target Attack Radar System* **Distribution Restricted**	16 NOV 06	FM 3-55.6 MCRP 2-1E NTTP 3-55.13 AFTTP(I) 3-2.2	Description: Provides procedures for the employment of JSTARS in dedicated support to the JFC. Describes multi-Service TTP for consideration and use during planning and employment of JSTARS. Status: **Current**
KILL BOX *Multi-Service Tactics, Techniques, and Procedures for Kill Box Employment* **Distribution Restricted**	13 JUN 05	FM 3-09.34 MCRP 3-25H NTTP 3-09.2.1 AFTTP(I) 3-2.59	Description: Assists the Services and JFCs in developing, establishing, and executing Kill Box procedures to allow rapid target engagement. Describes timely, effective multi-Service solutions to FSCMs, ACMs, and maneuver control measures with respect to Kill Box operations. Status: **Current**
SCAR *Multi-Service Tactics, Techniques, and Procedures for Strike Coordination and Reconnaissance* **Distribution Restricted**	NEW		Description: Provides guidance and procedures used by the Services to improve conduct of air interdiction as part of dynamic targeting. Specific areas of focus include: target development, vetting and validating, command and control, targeting criteria, and best practices for engaging targets inside the air tasking cycle that are not in close proximity to ground forces and require detailed integration with fire and maneuver. Status: **New (Worldwide Review)**
SURVIVAL, EVASION, AND RECOVERY *Multi-Service Procedures for Survival, Evasion, and Recovery* **Distribution Restricted**	20 MAR 07	FM 3-50.3 MCRP 3-02H NTTP 3-50.3 AFTTP(I) 3-2.26	Description: Provides a weather-proof, pocket-sized, quick reference guide of basic survival information to assist Service members in a survival situation regardless of geographic location. Status: **Current (At Printer)**
TAGS *Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System* **Distribution Restricted/ REL ABCA**	APR 07	FM 3-52.2 MCRP 3-25F NTTP 3-56.2 AFTTP(I) 3-2.17	Description: Promotes inter-Service awareness regarding the role of airpower in support of the JFC's campaign plan, increases understanding of the air-ground system, and provides planning considerations for the conduct of air-ground ops. Status: **Revision (Approved Apr 07)**

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TITLE	DATE	PUB #	DESCRIPTION / STATUS
TST *Multi-Service Tactics, Techniques, and Procedures for Targeting Time-Sensitive Targets* **Distribution Restricted**	20 APR 04	FM 3-60.1 MCRP 3-16D NTTP 3-60.1 AFTTP(I) 3-2.3	Description: Provides the JFC, the operational staff, and components MTTP to coordinate, de-conflict, synchronize, and prosecute TSTs within any AOR. Includes lessons learned, multinational and other government agency considerations. Status: **Current**
UAS *Multi-Service Tactics, Techniques, and Procedures for Tactical Employment of Unmanned Aircraft Systems* **Distribution Restricted**	3 AUG 06	FM 3-04.15 NTTP 3-55.14 AFTTP (I) 3-2.64	Description: Establishes MTTP for UAS addressing tactical and operational considerations, system capabilities, payloads, mission planning, logistics, and most importantly, multi-Service execution. Status: **Current**

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TITLE	DATE	PUB #	DESCRIPTION / STATUS
AIRFIELD OPENING *Multi-Service Tactics, Techniques, and Procedures for Airfield Opening Operations* **Distribution Restricted**	NEW	FM 3-17.2 NTTP 3-02.18 AFTTP(I) 3-2.68	Description: A quick-reference guide to opening an airfield in accordance with MTTP. Contains planning considerations, airfield layout, and logistical requirements for opening an airfield. Status: **New (Phase V, Signature Draft)**
CORDON AND SEARCH *Multi-Service Tactics, Techniques, and Procedures for Cordon and Search Operations* **Distribution Restricted**	25 APR 06	FM 3-06.20 MCRP 3-31.4B NTTP 3-05.8 AFTTP (I) 3-2.62	Description: Consolidates the Services' best TTP used in cordon and search operations. Provides MTTP for the planning and execution of cordon and search operations at the tactical level of war. Status: **Current**
EOD *Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal in a Joint Environment* **Approved for Public Release**	27 OCT 05	FM 4-30.16 MCRP 3-17.2C NTTP 3-02.5 AFTTP(I) 3-2.32	Description: Provides guidance and procedures for the employment of a joint EOD force. It assists commanders and planners in understanding the EOD capabilities of each Service. Status: **Current**
IADS *Multi-Service Tactics, Techniques, and Procedures for an Integrated Air Defense System* **Distribution Restricted**	30 OCT 04	FM 3-01.15 MCRP 3-25E NTTP 3-01.8 AFTTP(I) 3-2.31	Description: Provides joint planners with a consolidated reference on Service air defense systems, processes, and structures to include integration procedures. Status: **Current**
JAOC / AAMDC *Multi-Service Tactics, Techniques, and Procedures for Joint Air Operations Center and Army Air and Missile Defense Command Coordination* **Distribution Restricted**	22 MAR 04	FM 3-01.20 AFTTP(I) 3-2.30	Description: Addresses coordination requirements between the JAOC and the AAMDC. Assists the JFC, JFACC, and their staffs in developing a coherent approach to planning and execution of AMD operations. Status: **Current**
JATC *Multi-Service Procedures for Joint Air Traffic Control* **Distribution Restricted**	17 JUL 03	FM 3-52.3 (FM 100-104) MCRP 3-25A NTTP 3-56.3 AFTTP(I) 3-2.23	Description: Provides guidance on ATC responsibilities, procedures, and employment in a joint environment. Discusses JATC employment and Service relationships for initial, transition, and sustained ATC operations across the spectrum of joint operations within the theater or AOR. Status: **Current**
JTMTD *Multi-Service Procedures for Joint Theater Missile Target Development* **Distribution Restricted**	11 NOV 03	FM 3-01.51 (FM 90-43) NTTP 3-01.13 AFTTP(I) 3-2.24	Description: Documents TTP for threat missile target development in early entry and mature theater operations. It provides a common understanding of the threat missile target set and information on the component elements involved in target development and attack operations. Status: **Current (Expect to rescind in 07)**
MILITARY DECEPTION *Multi-Service Tactics, Techniques, and Procedures for Military Deception* **Classified SECRET**	NEW	MCRP 3-40.4A NTTP 3-58.1 AFTTP(I) 3-2.66	Description: Facilitate the integration, synchronization, planning, and execution of MILDEC operations. Serve as a "one-stop" reference for service MILDEC planners to plan and execute multi-service MILDEC operations. Status: **New (Approved 12 Apr 07)**

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TITLE	DATE	PUB #	DESCRIPTION / STATUS
NLW *Tactical Employment of Nonlethal Weapons* **Approved for Public Release**	15 JAN 03	FM 3-22.40 (FM 90-40) MCWP 3-15.8 NTTP 3-07.3.2 AFTTP(I) 3-2.45 USCG Pub 3-07.31	Description: Supplements established doctrine and TTP providing reference material to assist commanders and staffs in planning/coordinating tactical operations. It incorporates the latest lessons learned from real world and training operations and examples of TTP from various sources. Status**: Revision (Expect approval Apr 07)**
PEACE OPS: *Multi-Service Tactics, Techniques, and Procedures for Conducting Peace Operations* **Approved for Public Release**	26 OCT 03	FM 3-07.31 MCWP 3-33.8 AFTTP(I) 3-2.40	Description: Provides tactical-level guidance to the warfighter for conducting peace operations. Status: **Revision (Delayed until JP 3-07.3 is released)**
TACTICAL CONVOY OPERATIONS *Multi-Service Tactics, Techniques, and Procedures for Tactical Convoy Operations* **Distribution Restricted**	24 MAR 05	FM 4-01.45 MCRP 4-11.3H NTTP 4-01.3 AFTTP(I) 3-2.58	Description: Consolidates the Services' best TTP used in convoy operations into a single multi-Service TTP. Provides a quick reference guide for convoy commanders and subordinates on how to plan, train, and conduct tactical convoy operations in the contemporary operating environment. Status: **Current**
TECHINT *Multi-Service Tactics, Techniques, and Procedures for Technical Intelligence Operations* **Approved for Public Release**	9 JUN 06	FM 2-22.401 NTTP 2-01.4 AFTTP (I) 3-2.63	Description: Provides a common set of MTTP for TECHINT operations. Serves as a reference for Service TECHINT planners and operators. Status: **Current**
UXO *Multi-Service Tactics, Techniques, and Procedures for Unexploded Explosive Ordnance Operations* **Approved for Public Release**	16 AUG 05	FM 3-100.38 MCRP 3-17.2B NTTP 3-02.4.1 AFTTP(I) 3-2.12	Description: Describes hazards of UXO submunitions to land operations, addresses UXO planning considerations, and describes the architecture for reporting and tracking UXO during combat and post conflict. Status: **Current**

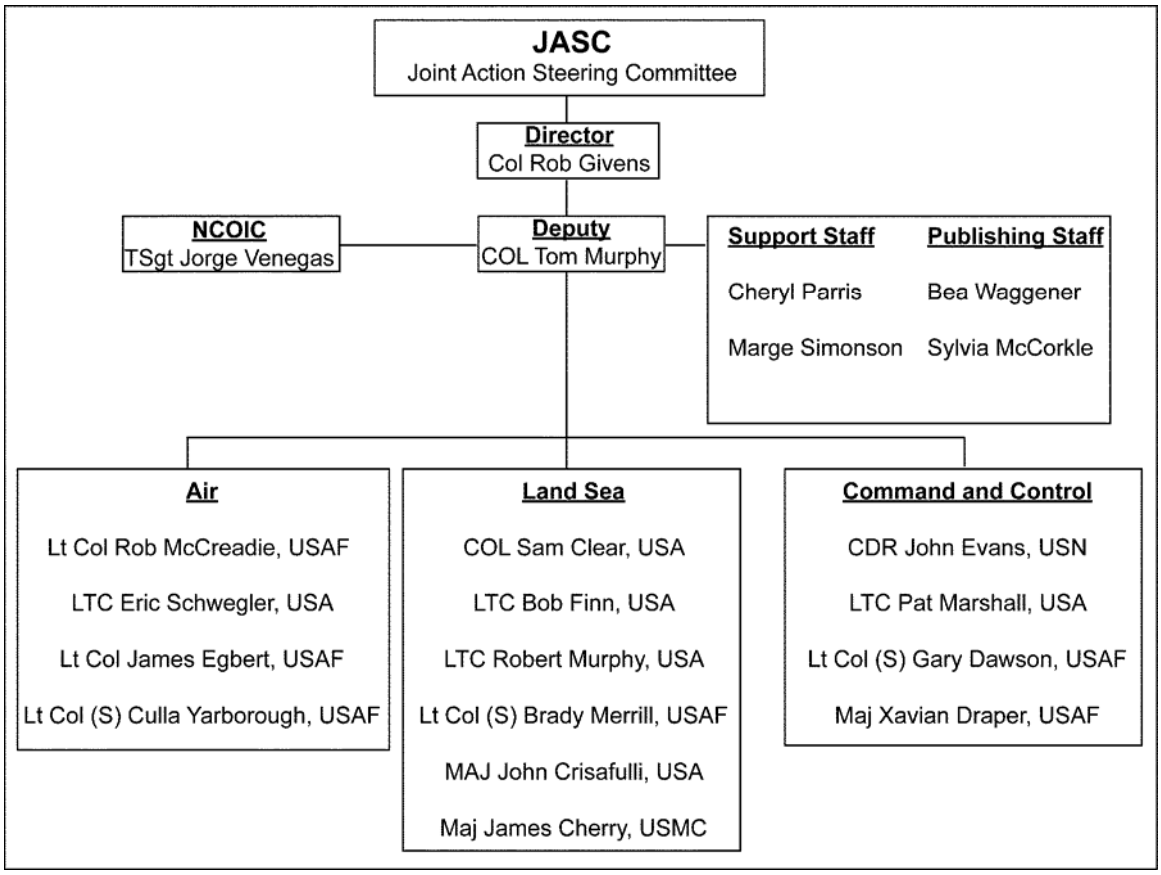
COMMAND AND CONTROL (C2) TEAM - POC: alsac@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
BREVITY *Multi-Service Brevity Codes* **Distribution Restricted**	15 JUN 05	FM 1-02.1 (FM 3-54.10) MCRP 3-25B NTTP 6-02.1 AFTTP(I) 3-2.5	Description: Defines multi-Service brevity codes to augment JP 1-02, *DOD Dictionary of Military and Associated Terms*. It standardizes air-to-air, air-to-surface, surface-to-air, and surface-to-surface brevity code words in multi-Service operations. Status: **Revision (Worldwide Review)**
CIVIL SUPPORT *Multi-Service Tactics, Techniques, and Procedures for Civil Support Operations* **Approved for Public Release**	NEW	FM 3-28.1 NTTP 3-57.2 AFTTP(I) 3-26.7	Description: Identifies standard TTP and Service capabilities for civil support. Assists the military planner / commander in the employment of military resources in response to domestic disasters in accordance with US laws and as directed by the President or Secretary of Defense. Status: **New (Expect Approval Apr 07)**
COMCAM *Multi-Service Tactics, Techniques, and Procedures for Joint Combat Camera Operations* **Approved for Public Release**	15 MAR 03	FM 3-55.12 MCRP 3-33.7A NTTP 3-13.12 AFTTP(I) 3-2.41	Description: Fills the void that exists regarding combat camera doctrine and assists JTF commanders in structuring and employing combat camera assets as an effective operational planning tool. Status: **Revision (Expect approval May 07)**
HAVE QUICK *Multi-Service Tactics, Techniques, and Procedures for HAVE QUICK Radios* **Distribution Restricted**	7 MAY 04	FM 6-02.771 MCRP 3-40.3F NTTP 6-02.7 AFTTP(I) 3-2.49	Description: Simplifies planning and coordination of HAVE QUICK radio procedures. Provides operators information on multi-Service HAVE QUICK communication systems while conducting home station training or in preparation for interoperability training. Status: **Current**

COMMAND AND CONTROL (C2) TEAM - POC: alsac@langley.af.mil

TITLE	DATE	PUB #	DESCRIPTION / STATUS
HF-ALE *Multi-Service Tactics, Techniques, and Procedures for the High Frequency-Automatic Link Establishment (HF-ALE) Radios* **Approved for Public Release**	1 SEP 03	FM 6-02.74 MCRP 3-40.3E NTTP 6-02.6 AFTTP(I) 3-2.48	Description: Standardizes high power and low power HF-ALE operations across the Services and enables joint forces to use HF radio as a supplement / alternative to overburdened SATCOM systems for over-the-horizon communications. Status: **Revision (Expect approval Sep 07)**
ICAC2 *Multi-Service Procedures for Integrated Combat Airspace Command and Control* **Approved for Public Release**	30 JUN 00	FM 3-52.1 (FM 100-103-1) MCRP 3-25D NTTP 3-52.1 AFTTP(I) 3-2.16	Description: Outlines the importance of an integrated airspace control function on the battlespace and describes the organization responsible for airspace control in joint operations. Status: **Current (**Being incorporated into TAGS revision.)
IDM *Multi-Service Tactics, Techniques, and Procedures for the Improved Data Modem Integration* **Distribution Restricted**	30 MAY 03	FM 6-02.76 MCRP 3-25G NTTP 6-02.3 AFTTP(I) 3-2.38	Description: Provides digital connectivity to a variety of attack and reconnaissance aircraft, facilitates exchange of near-real-time targeting data, and improves tactical situational awareness by providing a concise picture of the multi-dimensional battlefield. Status: **Revision (Expect approval Apr 07)**
IFF *MTTP for Mark XII IFF* *Mode 4 Security Issues in a Joint Integrated Air Defense System* **Classified SECRET**	11 DEC 03	FM 3-01.61 MCWP 3-25.11 NTTP 6-02.2 AFTTP(I) 3-2.39	Description: Educates the warfighter to security issues associated with using the Mark XII IFF Mode 4 Combat Identification System in a joint integrated air defense environment. Captures TTP that addresses those security issues. Status: **Revision**
JTF IM *Multi-Service Tactics, Techniques, and Procedures for Joint Task Force Information Management* **Distribution Restricted**	10 SEP 03	FM 6-02.85 (FM 101-4) MCRP 3-40.2A NTTP 3-13.1.16 AFTTP(I) 3-2.22	Description: Describes how to manage, control, and protect information in a JTF headquarters conducting continuous operations. Status: **Current**
JTF LNO Integration *Multi-Service Tactics, Techniques, and Procedures for Joint Task Force (JTF) Liaison Officer Integration* **Distribution Restricted**	27 JAN 03	FM 5-01.12 (FM 90-41) MCRP 5-1.B NTTP 5-02 AFTTP(I) 3-2.21	Description: Defines liaison functions and responsibilities associated with operating a JTF. Status: **Current**
REPROGRAMMING *Multi-Service Tactics, Techniques, and Procedures for the Reprogramming of Electronic Warfare and Target Sensing Systems* **Distribution Restricted**	22 JAN 07	FM 3-13.10 (FM 3-51.1) NTTP 3-51.2 AFTTP(I) 3-2.7	Description: Supports the JTF staff in planning, coordinating, and executing reprogramming of electronic warfare and target sensing systems as part of joint force command and control warfare operations. Status: **Current**
RISK MANAGEMENT **Approved for Public Release**	15 FEB 01	FM 3-100.12 MCRP 5-12.1C NTTP 5-03.5 AFTTP(I) 3-2.34	Description: Provides a consolidated multi-Service reference, addressing risk management background, principles, and application procedures. Identifies and explains the risk management process and its differences and similarities as it is applied by each Service. Status: **Current**
TACTICAL RADIOS *Multi-Service Communications Procedures for Tactical Radios in a Joint Environment* Approved for Public Release	14 JUN 02	FM 6-02.72 MCRP 3-40.3A NTTP 6-02.2 AFTTP(I) 3-2.18	Description: Standardizes joint operational procedures for SINCGARS and provides an overview of the multi-Service applications of EPLRS. Status: **Current**
UHF TACSAT/DAMA *Multi- Service Tactics, Techniques, and Procedures Package for Ultra High Frequency Tactical Satellite and Demand Assigned Multiple Access Operations* **Approved for Public Release**	31 AUG 04	FM 6-02.90 MCRP 3-40.3G NTTP 6-02.9 AFTTP(I) 3-2.53	Description: Documents TTP that will improve efficiency at the planner and user levels. (Recent operations at JTF level have demonstrated difficulties in managing limited number of UHF TACSAT frequencies.) Status: **Current**

ALSA ORGANIZATION



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